THE WEST AND THE NEW FRONTIER

by

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delivered at the
Commencement Ceremony
The Colorado College
June 10, 1957

President Benezet, Members of the Class of 1957, Distinguished Guests, Parents, Faculty and Friends:

It is a privilege to be here with you today. There are few experiences in life which embody all the elements of real significance which this ceremony carries for each of you and for the future of all men. We live in a world of change, but this class at this ceremony represents a vital link to the past, as well as a bright promise for the future.

You of the class of 1957 carry with you from your teachers, not only the shared intellectual experiences that go with the learning and the teaching of the wisdom of the ages, but high hopes that through you the frontiers of knowledge and the application of truth will continue to expand.

Colorado College has given you an understanding of history and of the foundations of our civilization. It will take you some time away from the college to gain the same kind of understanding of what it means to live and work in a society and an economy where a leaping technology and a geometric progression of change make so many of yesterday's landmarks carry a different meaning today. From that standpoint it is fortunate that each of you has had at least a few years of living and studying in the West. The problems created by change must be met as pioneers have always met their problems and this western country has a better understanding of what it means to be a pioneer than the older, more settled areas. We in the West are still very near the old frontier, and the spirit of the frontier is needed everywhere to meet the problems which we all confront today.

What is the background for today's fast-moving scene? And what does it mean to live every day with change as a constant companion? Do we have capacity to adopt innovation as a way of life?

About the time you were born, research and development was a minor part of the stream of our national activity. During World War II, science was married to the military effort and a vast expansion of research took place. Such new things as radar and the atomic bomb required tremendous mental and physical exertion and this introduced a new element to science, the requirement for large-scaled, organized effort. Invention became the work of organized teams and vast laboratories. Since the war, from this marriage has been born a giant. In the twelve years since 1945, more than fifty billion dollars have been spent in this country for scientific research and development; by the government, by universities and by industry. This year,

between six and seven billions will be spent to acquire new scientific knowledge and to apply the knowledge that has already been accumulated. The effect of all this on industry, and indeed on every phase of life, has been of equal scope. Today, almost without exception, everything to which the individual must adjust himself is big, or new, or fast-moving. We have the giant corporation, mass production, mass marketing, mass communication, big government, jet transportation, new materials and scientific management of it all. And just ahead is an even faster rate of change.

Here is a speculative timetable for earliest foreseeable launchings of astronautical vehicles from a responsible businessman who is also qualified in science*: (The more probable launching dates are from 10 to 20 years later)

> In about a dozen years or so, we will launch a satellite that will circle the Earth and Moon.
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> By about 1980, we will have made sufficient advances to permit the launching of a satellite that will circle the Earth and Mars.
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> By about 1990, or 33 years from now, we can go forward to the point of launching a space ship carrying human beings which will circle the Earth for an extended period as a satellite and return safely.
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> By the time you are only a few years older than I am today, you may well take passage on a space ship that will circle the Earth and Mars without landing and return safely.
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> If you live to be about seventy, you may be able to take passage on a vehicle that will land on the Moon and return, and this will weigh about one hundred and fifty tons and cost ten billion dollars.
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> If you live to be a hundred, and science may well make this possible, your opportunity will be expanded and you may take passage to land on Mars and return, in a vehicle weighing five hundred tons and costing thirty billion dollars. How long do you think it would take? About thirty-five days in each direction at a speed of about a million miles a day.

*Based on "Speculative Timetable for Astronautics," presented May 26, 1957, at the Commencement of the Missouri School of Mines and Metallurgy, Rolla, Mo., by James S. McDonnell, President, McDonnell Aircraft Co., St. Louis, Missouri. Earliest dates "based only on reasonable technical feasibility, with each project and cost being contingent on prior completion of all previous projects on schedule."

This is not Buck Rogers. This is from a man who has made a careful study of where the technological breakthroughs have to come.

The Scientific American for June, 1957, carries an article entitled "A Rocket Around the Moon," in which this passage occurs:

> "The possibility of actually bringing back some of the moon's material is a scientific bonanza so alluring that ingenious schemes have been proposed to accomplish it, even without landing on the moon. We might, for example, send a pair of rockets, one trailing the other closely by means of a homing device. The first rocket would drop a small atomic bomb on the moon, and the second would sweep up some of the debris blasted from the moon's surface. Since the moon has no atmosphere and comparatively little gravity, the bomb cloud would rise very high. The second rocket could dive into the cloud, collect some of the spray and emerge from its dive by means of an auxiliary jet. Of course such a maneuver would require a miracle of electronic guidance; the rocket would also have to be provided with equipment which could analyze the particles of collected material and transmit the information to us. But all this seems to lie within the realm of possibilities in the expected development of guided missiles during the next few years."

In not too many years, one of you may be standing here addressing the graduating class, and spur on the young men and women of that day with this advice: "Hitch your wagon to a star and I'll see you on the moon."

Another outstanding business leader **, qualified in science, stated just a week ago that "the next fifty years will see such unprecedented technological progress that it will shape the destiny of civilization for centuries." He continued, "In my lifetime, we have increased our standards of living more than in all previous recorded history. At the present rate of productivity increase, we will double our standard of living in another eighteen years."

These are the kinds of momentous changes with which you and I will have to live out our lives. We must be able to understand what drives the scientist upward to a duel with outer space, or downward within the earth's crust to seek a rival for the brilliance of the sun. We must learn to live with this restless, driving, insatiable search for new knowledge and how to apply it. In making our own plans and in all our decisions, we must take account of this never-ending, intellectual effort to see the symmetry of the universe through the eye of its Creator. In essence, it is the search for truth and understanding.

In today's world, the physical power available to men and women to build or to destroy, for good or evil, is greater than it has ever been before.

We stand today at the middle of a century, in which two destructive world wars have unleashed vast forces of violence; two political revolutions have run a course of extreme scope and intensity; five empires have collapsed; two major colonial systems have suffered a drastic decline; and many new nations have come into being to grope their way along the hazardous thoroughfares of international intercourse.

** From "Frontiers In Your Future," by Dean A. McGee, President of Kerr-McGee Oil Industries, Inc., Oklahoma City, Oklahoma; an address to the graduating class at Oklahoma City University, May 31, 1957.

Before World War I, eight great nations ruled the world. In the period following World War II, the United States and the Soviet Union stand face to face, with clashing concepts of political and social organization. Who can grasp the true significance of such great changes in so short a time?

But the end is not yet. The unsettled conditions of a politically polarized world are but a vast mosaic across which flows the surging power of our newest revolution -- the scientific revolution. Scientists working in vast laboratories cannot see an atom, but can make it fuse or fission. They cannot see inside a certain bacterium, but know it operates like a miniature factory, closing down for re-toolingwhen a new raw material is fed to it. They can make this knowledge work for you and me. They can place a man-made harness on the electron frequency of the caesium atom to produce an atomic clock of extreme accuracy. They can invent a new product that will create a new industry almost overnight, and at the same time obsolete an old one.

When we consider the acceleration taking place in our present rate of change, and consider how to live with it, there is another fact to note. The new knowledge and the power which science creates knows no limit of language or national boundary. It is at work, in one form or another, all over the world.

> "Science," says C. N. Hinshelwood, "is not the mere collection of facts, which are infinitely numerous and mostly uninteresting, but the attempt of the human mind to order these facts into satisfying patterns * * *." R. E. Gibson calls science, "The study of human experience, the establishment of the validity of this experience, and the fitting of valid experiences into satisfying patterns of structures, which can be communicated unambiguously to others * * to achieve comprehension, understanding, and power of prediction." He also adds, "As the patterns of science are extended, their ability to include more complex subjects grows exponentially and the limits of their application are still far away."

The thoughtful person today, viewing the expanding universe and the exploding boundaries of knowledge, can hardly escape a conviction that each of us faces nothing less than a mental revolution. The inexorable forward march of the scientific revolution, feeding as it does self-regenerative, and, therefore, inexhaustible, forces, seems to require in the years ahead a new way of life. And herein lies the opportunity for the man with broad humanity; with the highest qualities of mind and spirit. Vannevar Bush has called science "The Endless Frontier." For the non-scientist, it creates another frontier -- the frontier of change.

If the limits of the application of science to more and more complex subjects are still far away, the need for new decisions in our on-rushing democracy and for the taking of new sights on our old landmarks cannot be postponed. It is well to remember that the results of the scientific revolution have all been obtained through the mental processes of human beings. All the principles and laws expressed by scientific words and

symbols were arrived at by men who possessed such human attributes as imagination, power of abstraction and synthesis, perseverance and patience. These qualities are no less required by our democracy in its constant effort to select and reinforce the trends which will enrich our society and make it mean more to each of us. Here, as in science, the total accomplishment is the sum of many accomplishments made by individuals, one by one.

With all our new knowledge and material advances the crucial problem is still the proper relationship between man, the individual, and the institutions of his society. These relationships are not stable or happy in times like these. They are subject to stress and dislocation. Perhaps we can agree with Edwin A. Alderman that "only the great spirits of the world have the strength to pass happily from one era to another. The strand of every new age is lined with the wrecks of earnest, high-souled men who had not this strength." And Dwight W. Morrow asked this question: "What happens to families and communities and races that merely live in houses that have been built for them? It is the oldest tragedy in history - - repeated over and over again."

As you go out from Colorado College today, you have little choice but to start your new life within the institutions and houses that previous generations have built. But men of my generation hope that you have laid here the foundations on which to build better structures for the future and to develop the strength to pass happily from this into another era. If the scientist, studying the universe, and reducing its phenomena to symmetrical patterns of fact capable of "exact expression" and "quantitative communicability" can feel an "intellectual ecstasy" like nothing so much as "the old-time religion," think what rich rewards can come to those capable of utilizing in the broadest way a combination of wisdom and understanding and today's new knowledge to aid mankind in finding those guides to thought and action now needed by each of us in this era of innovation and change. Opportunities of this kind will knock on your door. I hope you will be ready to answer.

But let us not underestimate the difficulties.

There is, first of all, a time of preparation over and above that already gained here at Colorado College. Sheer intellectual effort, the use of the blank piece of paper and the pencil can hardly yield the answers so much needed today unless employed by careful students who have lived intimately with humanity at work and play. And, of course, the first job is to find a job. Here the liberal arts graduate who is not going on to specialization seems at a disadvantage. He sees the talent scouts of the corporations look the other way when reminded of the commencement address eulogies of the generalist so euphoniously pronounced by the presidents and the chairmen of the boards of directors. He sees the engineer or other specialist offered beginning salaries equal to or above those of many of his teachers. He searches mostly in vain for any opportunity that does not too heavily discount his decision against early specialization.

If we frankly admit that during the first few years in the business world the liberal arts graduate is, generally speaking, under a handicap in his competition with the specialist for salary and advancement, we must admit also that this is a period when he has little choice, under present conditions, but to meet the specialist on his home ground. The

reason is not hard to find. Competition in the early years is almost all in the area of "how to do it" - - - how to produce more, how to increase sales, how to obtain greater accuracy, how to cut costs, how to feed a problem to an electronic brain. Later on, for those with the opportunity to work nearer to general manager, President or board chairman, the emphasis will shift to the area of what is worthwhile to do and how to work through people to get it done. Now, the specialist will have to compete with you on your home ground. Now you should be better able to judge what goals are significant for man to seek, how best to organize the search, which shortcuts may lead to danger or dead ends; and by which stars to steer toward the enrichment of human life and the best values of our society. And make no mistake about this: Our system of values, enforced through competition and survival, more and more selects for the places of greatest responsibility the business, political or other institutional leader who places a proper value on these goals. No longer is the religious leader so much alone in emphasizing the value of our moral and spiritual inheritance in our search for the true meaning of life.

All the stars by which man steers the ship of society on a safe course toward worthwhile goals are not visible all the time. But some are bright enough to shine through haze, and there are enough breaks in the overcast for those who know the broad pattern of the heavenly landmarks to reset the course toward what is worth doing. It is the generalist, the great spirit, the man who has grown his soul, that is looked to for this service.

We hear the scientists talk today of inertial guidance, stabilized platforms, and feed-back control in the system that directs the giant intercontinental missile. The generalist knows there is some counterpart for each of these in the machine of society. There is an inertia of shared values, a stabilization of common goals, a feed-back of individual growth and satisfaction which we human beings develop from the give and take of living together by generation after generation. These forces are a composite of religion and philosophy and science and what we call common sense and human nature. Here in the United States, in formal, or legal, terms, we live by a constitution under which the people, all the people, join together "to form a more perfect union, establish justice, insure domestic tranquility, provide for the common defense, promote the general welfare, and secure the blessings of liberty to ourselves and our posterity." Even when we are subject to the confines and restraints of today's massive social organizations, guarantees of freedom of religion, freedom of speech and of the press, the right of peaceable assembly and petition, security against unreasonable searches and seizures, habeas corpus and trial by jury, protection from slavery and involuntary servitude, due process of law, equal protection of the law, and the right to vote are still the foundation of individual freedom. They are the opposite of fear, force, and coercion. They are the basis of understanding and a will to cooperate.

They are as valid articles of faith for the generalist as the reproduceable experiment and mathematical analysis are for the specialist. They are the old principles which you must now apply to new problems as you learn to live and work within disciplined large groups and still supply leadership through the power of your personal example, to marry self-interest with the general-interest, to help limit the abuse of inordinate self-seeking, to prove the basic adequacy of the performance in action of our democratic concepts and institutions.

In less formal terms, and in spite of all our troubles, we enter the new era of science with a system of society that values the individual as such, welcomes diversity as

well as conformity, and thrives on individual initiative. The inter-acting factors which affect the individual produce a climate of confidence in which the energies of millions combine for great achievement. We inerhit a basic doctrine that every individual is entitled to life, liberty and the pursuit of happiness.

We have learned that if we make more things and make them cheaper, everybody's share is bigger; that progress comes through competition; that through freedom, the individual seizes opportunity to pursue his own well-being and happiness; that the dignity of the individual is a precious thing; that equality of opportunity is a goal to be sought, and that solutions to our most difficult problems come through laying them before the largest number of able minds. These work-a-day concepts are a down-to-earth application of the high idealism of our constitution and bill of rights. They are the bright stars and the ancient landmarks which you have learned here to know and to value.

If you are wise, and if you really mean to earn a place as one of the great spirits of the world through building a more happy and liveable house for mankind, you will tolerate no hiatus between the stimulating atmosphere of Colorado College and the equally stimulating segments of atmosphere that will exist wherever you find your first job. This is essential to the continuation of your preparation. It is the cultivation of the home ground on which ultimately the specialist will have to meet you. Get to know your public librarian. Ask him about his great books series. Join the fratemity of those who read the journals in his "intellectual corner" and you'll be surprised how many top business and professional leaders you find there. And, above all, find a way to keep in touch with the great minds of the nearest liberal arts college or university, and add them to those you already know here at Colorado College.

Have I already trespassed beyond the threshold of your tolerance for advice? If not, permit me one more idea. For those of you who have grown up here in the West, you had a father or a grandfather who knew the frontier. He knew what it meant to have courage, to live with uncertainty, to cooperate without compromise of personal responsibility. These are still the qualities, the emotional dimensions, that mark today's citizen of the new frontier - - a frontier of change, scientific, technological, social and political.

And this western country (the midwest, the southwest, the Rocky Mountain empire) still provides the dimensions, geographic, economic, social and human within which the problems of the new frontier of change can be pioneered and answers found. For those of you who want to be bearers of the ideas of this new frontier, the west today offers unusual opportunities, just as it did for your father or grandfather. The pressures for submergence of the individual are not so strong here as elsewhere; it's easier to find colleagues who want to join hands. Just ahead, for states like Colorado and Oklahoma, is a period of economic growth that will bring a flowering of education and culture. We here in this open country have a chance, through the application of foresight and the development of widely shared goals, to avoid the mistakes and escape the almost insoluble problems of the older metropolitan areas, now flowing each into the other in a giant amorphous congested megapolis, afflicted with pollution of air and water, cynicism, and a great weariness. In that atmosphere people are just plain tired of other people. When Horace Greely a hundred years ago advised aspiring young men to "turn your face to the great West, and there build up a home and fortune," he spoke for the twentieth century, as well as for the nineteenth.

Wherever you make your home, you can count on this: There is no way you can know today how you will be earning your living in future years. This is the meaning of change. But there is something more important that you can know for all the years to come; as a liberal arts graduate of Colorado College - - That human beings are the most important things in the world; that no matter what emphasis the age of specialization places on the "how to do it" theme, you will never cease to ask what is really worth doing.